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Biography

PRINCIPAL J. CRAIG, M.A., M.R.C.V.S.

In selecting Professor Craig to guide the destinies of the profession during the forthcoming year, the Council made a wise choice, for the settlement of the questions regarding the position of the members of the profession who practise in the Irish Free State has been for some time a somewhat curious one ; especially in regard to the payment of the Annual Registration fee to the governing body at Red Lion Square, and in certain other points of importance and mutual interest. It is well known that Professor Craig has worked very hard to bring matters to a satisfactory conclusion and there is a prospect now of this taking place.

After taking his B.A. at Glasgow University Professor Craig entered the Glasgow College as a veterinary student, passing his earlier examinations there and transferring to the London College in order to take the final ; being awarded the Diploma in 1902. Shortly after qualifying he applied for the Professorship of Anatomy in the Dublin Veterinary College, his candidature being accepted; and after the death of Professor Mettam, Professor Craig was selected for the office of Principal, an office which he has filled worthily ever since. Elected to the Council of the Royal College of Veterinary Surgeons in 1919, Principal Craig has served on many Committees, and his election to the Presidentship has placed in charge of the ship of state a man whose opinion is always well thought out before being expressed, and who can be absolutely relied upon to carry out the onerous responsibilities and duties in a manner which will reflect credit upon himself and the profession.

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Editorial

THE PROPOSED "MEDICAL" DIRECTOR OF THE "ANIMAL" DISEASES RESEARCH ASSOCIATION.

ALTHOUGH it may be said that there is no monopoly in regard to research into the diseases of animals yet it must be admitted beyond question that this comes primarily within the domain of the *veterinary* research worker; as there is no better foundation for that than is obtained by the graduate in veterinary science. The information which was recently brought forward at the National Veterinary Congress at Ayr, that there was a proposal to put a *medical* man in charge of the laboratories and field work of the *Animal* Diseases Research Association struck the members present with astonishment, and seems almost ridiculous. In the hope of nullifying such an idea a resolution was unanimously passed against it, *stating emphatically that this was a post which ought to be occupied by a veterinarian.* The good work which Professors Gaiger and Pool have done on certain sheep diseases during the past few years is sufficient evidence of the value of the properly trained man being at the head of his own class of work; and, in this instance especially, for the post of Director to be filled by a scientist who is a member of the veterinary profession.

What needs to be done is to persuade those in authority, and those who are on the selective board, that veterinary research is as important to the Agriculturist and Stockowner as is the work of the hospital laboratory worker to those who treat human diseases; and that to be carried out effectively the laboratory worker must first acquire a thorough knowledge of the animals in health—otherwise how can he know them in disease? No one has a better foundation of this kind than the student of veterinary science, and if after he has qualified he accepts a laboratory post he is all the better man for having previously been an efficiently trained student of animal hygiene. The laboratory at Moredien has been built and financed *for the express purpose of helping the farmer over the questions concerning the contagious diseases of animals* and the good work done already has proved the wisdom of the selection of its Veterinary Directors. The profession is, quite naturally, much perturbed at the suggested change in regard to the qualifications for its management. Let us hope that this point of view will receive very careful consideration. Moreover, it is a very great pity that the proportion of those holding veterinary qualifications on this Committee, which was formed for the express purpose of dealing with research into animal disease problems is in such a hopeless numerical minority.

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General Articles

THE OPERATIVE TREATMENT OF TRAUMATIC INFLAMMATION OF THE NAVICULAR BURSA WITH PRESERVATION OF THE DEEP FLEXOR TENDON.*

By PROFESSOR GERHARD FORSSELL,
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TRAUMATIC inflammation of the navicular bursa implies the inflammation resulting from the passage of a foreign body through the deep flexor tendon into or through the bursal cavity.

Before considering the several degrees of perforation with their complications and treatment, some remarks will be made on the physiology and the anatomical disposition of this region.

The distal sesamoid bone lies completely within the convex line described by the insertion of the deep flexor tendon into the third phalanx and its cartilages (see Fig. 1†). Because of this relationship the minimal frictional movement that occurs between the distal sesamoid bone and the deep flexor tendon cannot be due to the passage of tendon over bone, but results from the movement of bone upon tendon in the following manner: the articulation between the third phalanx and the distal sesamoid bone is such, that when weight is placed upon the limb the distal sesamoid bone moves slightly downwards and backwards producing a limited gliding movement between its posterior surface and the tendon.

The structure of the deep flexor tendon in the region of the distal sesamoid bone is quite complex. Generally speaking the tendon resolves itself into two symmetrical parts, each composed of spirally-disposed fibres which radiating to their insertion form a fan-like expansion. The surface of the tendon in immediate contact with the distal sesamoid bone is practically devoid of blood vessels. A few millimetres from the surface, isolated macroscopic vessels occur and these become more numerous towards the posterior face of the tendon related to the digital torus. The borders of the bursa are highly vascular.

Perforation of the navicular bursa may be simple or complicated by primary or secondary infection. In the case of perforation *without infection* the prognosis depends upon the extent and site of the injury. If the distal sesamoid bone is not involved healing will take place fairly readily particularly if the perforation be located in the vascular part of the bursal wall. If, as is usual, the bone is injured the so-called

* Translated by Geoffrey Brooke, B.Sc., M.R.C.V.S.
† The illustrations will appear at the conclusion of the article.

Traumatic Aseptic navicular bursal inflammation follows. In such a case spontaneous recovery will not occur unless there is only minimal injury to the cartilage overlying the sesamoid bone or the cartilage itself undergoes exfoliation (aseptic death). If neither of these conditions obtain the bone invariably becomes the seat of rarefying degenerative processes with secondary involvement of the bursa. Lameness in such cases may, after a time, be quite slight but so persistent as to demand either neurectomy or slaughter. The author has observed such cases in which two years after the original injury, healing of the bursa has still been incomplete.

The sequelæ of perforation with infection depend upon three factors. Firstly the type of invading organism ; secondly the extent to which pus can gain exit from the part, and thirdly the implication of certain related structures.

Infection with the common pus-forming organisms can lead to either an acute or sub-acute condition. In the acute type considerable inflammatory change results ; within ten days tissue break-down occurs in the substance of the tendon leading to partial or complete rupture and simultaneously the cartilage over the flexor face of the sesamoid bone is exfoliated ; osteo-myelitis then develops in the bone with possibly secondary fracture. In the sub-acute form tissue destruction is proportionately slower. Exfoliation of the cartilage takes place less rapidly so that when an operation is performed it is revealed only partially destroyed. Healing in such a case may supervene if the cartilage ultimately undergoes complete destruction to permit of the obliteration of the bursa by granulations arising from the bursa boundaries and from the denuded bony surface.

If Bacillus necrophorus shares in the infection focal necrosis of the tendon supervenes. The process varies in extent and the affected areas show the characteristic yellow-green colour and soft consistency. B. necrophorus appears to have a geographical incidence. In Stockholm it is rare to find a quittor resulting from an infected " corn." In other areas in Sweden this is not uncommon. Some authors such as Nocard, Eberlein, etc., mention tendon necrosis as the regular sequel to perforation. When contrasted with conditions obtaining in and around Stockholm, such a statement would seem to point to a more regular infection by B. necrophorus in districts known by these writers. Other complications depend on the implication of certain structures related to the bursa. Infection may reach the distal inter-phalangeal joint by a direct anatomical communication ; the articulation may be similarly infected if the foreign body perforate the phalango-sesamoidean ligament. Involvement of the digital sheath or of the distal interphalangeal joint can result from a spreading of the inflammatory

process upwards from the proximal border of the bursa. Abscesses near the coronary margin or within the digital cushion can also occur together with quittor.

Treatment.

The treatment of purulent bursitis has varied at different periods. In early times caustics either in the liquid or solid form were forced into the perforating tract to induce sloughing of its walls but the results were not satisfactory. At the commencement of the nineteenth century Dietrichs and others introduced partial resection of the deep tendon but without gaining much support for the operation. In 1853 a Belgian Veterinary Surgeon, André, described the operation of total resection of the deep flexor tendon (Note :—in some works André appears to have been referred to as " De Fleuris," which is actually the name of his town of residence). André reports five cases. One died from Tetanus, cases 1, 2 and 3, showed no lameness after seven, two and four months respectively. In case No. 4, lameness was absent after one month. The same author reports favourable results following the operation on cattle. André's work appears to have been forgotten at this time. In 1879 Nocard recommended an operation similar to that of André whose writings were now revived. A number of articles then appeared recording the experience of several veterinary surgeons with the various operations.

The precise technique of the operations differed. André and Nocard removed the anterior part of the digital cushion to expose the deep tendon, which was resected from the level of the posterior border of the distal sesamoid bone forward to its insertion. Nocard used a curved incision when sectioning the tendon ; the curve was convex backwards and thus the outer fibres of insertion of the tendon were preserved intact. All the cartilage was curetted away from the surface of the sesamoid bone. These authors emphasised the importance of also curetting away the small fringe of tendon tissue remaining attached to the bone after resection. Nocard went further in that he curetted the bony surface of the semilunar crest, thus exposing the more porous subjacent osseous tissue which he presumed granulated more readily. Curettage of the tendon insertion appears to have been discarded. More of the frog has been removed by other operators. In some cases two-thirds and in others nearly the whole of it. Moller and Vennerholm reflect the anterior two thirds of the frog and, having operated on the tendon, replace the part.

The results of these operations differed widely. André and Nocard had strikingly good results. Nocard's first three cases returned to work free from lameness in six weeks after operation ! Merillat, on the contrary, asserts that after tendon resection patients are never

absolutely free from lameness. Vennerholm is also sceptical as to the final results. He considers that the fibrous tissue which replaces the defect in the tendon is never so strong as the original tissue and that ruptures occur in its substance, resulting in lameness. Recovered cases are therefore most suitable for slow agricultural work. Many authors recognise that the best results are obtained in draught animals but cases are on record of successful recovery in light horses. Thus Schmidt cites a case of a racehorse which was able to race within a year of the operation. Morkeberg also reports a successful operation on a thoroughbred animal. The number of authors mentioning neurectomy as a " dernier résort " to restore the subject to usefulness bear witness to the fact that in many cases the operation has not yielded good results.

In the face of these results it is questionable if such a radical procedure as total resection is justified. The author believes it is not justified. After total resection in addition to obliteration of the bursa considerable repair to the tendon must be effected. Is it not possible to secure a healing of the bursa with less injury to the tendon ? As has been emphasised the tendon in this region has a complex structure in conformity with the special function it is called upon to play ; it is, therefore, essential to preserve its integrity, at the same time removing necrotic portions wherever located. Most authors have advised against partial resection because of the less satisfactory results obtained. The reason for this lay in the fact that such an operation did not produce the necessary conditions for healing. The cartilage may be exfoliated either by the action of a purulent inflammation or by curetting at the time of operation. In the majority of cases of partial resection the half exposed sesamoid bone could not be completely curetted, and since the drainage established by the operation released the pus the residual cartilage remained attached to prevent subsequent healing.

The author has evolved an operation which over a considerable number of cases has given satisfactory results and enabled the patients to return to work. The objects of the method are fourfold, viz. :—

1. To resect all necrotic parts of the tendon.
2. To effect good drainage.
3. To remove all cartilage from the flexor surface of the sesamoid bone.
4. To inflict a minimum of injury upon the deep flexor tendon.

Technique.

The bars, frog and related parts of the sole are well pared down. A groove is cut in the sole ; this starts from the angle between the wall

and the bar of one side, reaches forward to pass immediately anterior to the point of the frog and returns to a corresponding point on the other side of the foot. It is excavated with a hoof knife and should reach the summits of the subjacent vascular papillæ. With an ordinary scalpel the horny tissue around the inner border of the groove is separated from the underlying matrix. Care must be taken to avoid injury to the latter by keeping the knife edge close to the horny layer. With the help of a specially constructed instrument, the sole is now elevated in the region of the point of the frog, grasped with pincers and reflected backwards from the frog, its collateral sulci and the bars. The perforating tract is enlarged with a knife and a probe inserted to estimate the condition of the tendon in the vicinity of the puncture. A mid-line incision is now carried through the frog corium and digital torus extending from the point of the frog in front to the level of the prominences of the heel behind and reaching down to the posterior face of the tendon. With a finger introduced into the incision the borders of the distal sesamoid bone are palpated through the thickness of the tendon and with the knife point the tendon is perforated immediately over the middle of the bone. A button scalpel (blunt bistoury) is inserted through this opening and the tendon incised in the mid-line forward as far as its insertion and backwards to the level of the posterior borders of the seamoid bone. Such an incision, while extending backwards sufficiently to drain the posterior reaches of the bursa should never open into the tissue posterior to this : otherwise infection may implicate the digital sheath or the distal interphalangeal joint. At this juncture the tendon is carefully examined. If one suspects a necrotic focus around the traumatic perforation the latter is exposed by incision of a minimum amount of fleshy frog. Necrotic areas are removed and if only a narrow strip of tendon tissue remains between the incised area and the original mid-line incision the strip should be resected. The integrity of the digital torus should be preserved as far as possible. This, lying in contact with the posterior face of the tendon is intimately concerned in the blood supply of the latter (*vide supra*). The sesamoid bone is now examined. Sometimes the flexor surface is found intact with the cartilage normal. In other cases the latter is completely exfoliated and the exploratory probe encounters exposed bone over the whole surface. If cartilage is present it is removed with a special curette (Fig. 5). An assistant grasps the toe and flexes the distal interphalangeal joint ; in this position the curette is inserted into the bursal cavity first to the one side and then to the other. By forward, backward and lateral movements of the instrument the cartilage is readily removed and though some small islands remain these exfoliate later. Some curettes are made to work in one direction only, and in such a case

after completing a stroke the instrument is brought back to the starting point by lifting it from the bony surface and slipping its blunt face along the tendon. The underlying bony surface may suffer a little, but this appears to have no detrimental effect. In this connection one may recall that Nocard in his " total resection " operation practised curettage of the superficial dense bone to expose the more porous osseous tissue and obtain better granulation.

The bursa is now thoroughly irrigated ; a curved canula is inserted and the cavity flushed first with hydrogen peroxide solution and finally with strong tincture of iodine (B.P.). A gauze drain is inserted through the incised tendon ; to counteract the bleeding commonly succeeding hoof operations, the super-imposed wool dressings are soaked in hydrogen peroxide solution. The part is bandaged in the usual way and covered with sacking. The latter can be changed as soon as advisable. If practicable the bandages should be left in position for several days though soaked with blood ; infection can be prevented by drying the bandage in position with the " Hot Air Apparatus."

After treatment. When healing is nearly accomplished, the foot is shod with a protective sole, metal or leather. The former is the better as it is more easily removed. The shoe should bear caulkins one inch or a little more in height. The toe should be pared down and kept short. If it is allowed to grow long it causes tension upon the cicatrix and the animal will go lame.

In a few cases dealt with by the writer the operation was modified. The incision through the fleshy frog was so disposed as to pass through the perforating tract. When the sesamoid bone was exposed with a corresponding incision through the tendon it was found difficult to curette the further half of its surface. A mid-line incision is also preferable in that it passes through that part of the tendon least concerned in bearing weight, i.e. the centrally placed groove depicted in Fig. 2. In two cases a caustic solution (10 per cent. Arsenious Acid) was used to remove the cartilage.

The progress of the patients after operation varies. The animal is always very lame during the first few days, but gradual improvement is seen until at the end of several weeks weight is being borne by the affected limb. In some cases the acute lameness lasts longer, two or three weeks elapsing before the leg is used at all. In the average case a shoe can be put on after six weeks. In three months the subject can do light work whilst after six months fast work can be accomplished without lameness.

Some cases exhibit complications of so serious a nature that destruction is advisable, as, for example, in cases of extensive necrosis and

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ultimate rupture of the tendon, infection of the distal interphalangeal joint, the digital sheath or rupture of the collateral sesamoidean ligaments.

It is obvious that with an infected perforation of the navicular bursa a better prognosis can be given if this operation is performed early. The longer the infection is allowed to invade the tissues the less will be their power of recovery. It is essential therefore to determine if infection is present, and just as it is necessary to treat the fresh case of "nail tread" conservatively, so is it essential to proceed immediately to operation once infected perforation is diagnosed. By exposure of the nail tract (and cautious use of the probe finally) one can usually determine if the lameness is due to injury to the digital cushion, an abscess on the posterior face of the tendon or involvement of the bursa. If the latter, postponement of operative interference is only justified where there is very slight infection or where the exact nature of the injury remains undetermined.

(*To be continued.*)

BACILLUS ŒDEMATIENS INFECTION IN CATTLE.

By T. J. BOSWORTH, B.Sc., M.R.C.V.S., D.V.S.M., and L. JORDAN, M.R.C.V.S.,

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THE investigation of a recent outbreak of disease in a herd of young cattle has led to the conclusion that the deaths which occurred were attributable to infection by B. œdematiens (B. novyi). Although occasional references to this organism as a cause of disease in animals have from time to time appeared in the literature it is only within recent years, as the result of a number of observations in various parts of the world, that its importance in veterinary pathology has become definitely established. A brief summary of the available publications dealing with this subject will suffice to illustrate its significance.

As long ago as 1894 Kerry isolated from the muscle of a cow believed to have died of blackleg an organism resembling Novy's B. œdematis maligni II (B. novyi). Von Hibler (1908) reported a case of infection in a wild hog due to B. novyi. The lesions present resembled those of Rauschbrand. Diedrichs (1911) recorded the death of two horses as the result of anærobic infection. The cultures obtained from these cases were apparently impure but one of them after several animal passages produced in the guinea pig an abundant colourless subcutaneous œdema thus resembling B. œdematiens. Weinberg and Séguin (1917)

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described a case in which a mule that was being used for the production of antivenin developed an infection due to B. œdematiens and B. histolyticus. The animal recovered following the administration of several doses of mixed serum. Heller (1920) isolated B. œdematiens from three horses that died whilst they were subject to an immunity experiment and Hall described a strain of this anærobe recovered from a fatal case of wound infection in the same species. Mejlbo (1925) isolated the organism from a case of gas gangrene in a pig whilst Zanolli and Catino found it associated with B. histolyticus and another organism in the case of a horse that developed an infection whilst undergoing hyperimmunisation.

The outbreaks recorded up to this time, however, had involved but a limited number of animals and it was not until 1927 when Turner and Davesne identified as B. œdematiens the organism isolated by Albiston from a number of cases of " black disease " of sheep in Australia that the extent of the losses among livestock which may under certain conditions be caused by this anærobe came to be fully realised. In a later publication, in which he records a case of this disease in a cow, Turner mentions a private communication from the German investigator Zeissler to the effect that a condition which he has described as " die infektiose Lebernekrose der Schafe " appears to be identical with " black disease " as seen in Australia.

In this country McEwen (1927) isolated B. œdematiens in pure culture from the muscle of a bovine animal that was thought to have died of blackleg. Scott in America (1928) gives the following record of the isolation of seven strains of this organism from blackleg cultures or material obtained from cases of blackleg :—

" The first strain was obtained in connection with C. welchii in a case of clinical blackleg. A second strain from dried sheep muscle which also contained C. tertius and C. sporogenes. Two samples of dried muscle virus sent to this laboratory as blackleg virus contained C. novyi only. The fifth strain was obtained from an atypical C. chauvæi culture. The sixth strain was isolated from a case of clinical blackleg. A study of a recent outbreak of blackleg-like disease in a flock of lambs revealed the presence of C. novyi in these cases," Weinberg and Milhailesco (1928) reported the presence of B. œdematiens in six samples of blackleg material examined by them. Three of these were from sheep in Australia, two from cattle in Germany and one from an ox in the Ukraine. Zeissler (1928) has also recorded the isolation of this organism from several cases of blackleg.

It is of interest to note the result of this author's examination of two cultures which had been considered to be those of a very toxigenic variety of the blackleg bacillus. The strains in question, both isolated

from cases in cattle (one by Ivanic and the other by Kojima) proved to be B. œdematiens. Therein lies a possible explanation of the true nature of some other strains of so-called B. chauvæi which have been described as producing a soluble toxin.

The outbreak which forms the subject of this article occurred in West Norfolk in the practice of M. Bray, Esq., M.R.C.V.S., of Docking, to whom we are indebted for supplying material for examination together with an account of the history, symptoms, and *post-mortem* appearances of the affected animals. The disease broke out early in February last in two groups of young cattle numbering one hundred and eighty respectively. These animals, which were about eight months old, were the property of one owner who had purchased them in Lincolnshire some six months previously. The two groups were kept separately on adjoining farms being allowed out to grass in the daytime and brought into yards at night and during rough weather. The district is one in which cases of true blackleg are quite uncommon, but to Mr. Bray's knowledge occasional deaths among cattle have from time to time occurred on these particular farms in which the symptoms shown were similar to those observed in this outbreak. These consisted of high temperature, loss of appetite, and marked stiffness of gait particularly of the hind limbs. The animals were disinclined to stand, and when forced to do so showed signs of dyspnœa and distress. In the later stages they were unable to rise. Their condition rapidly became worse, and death took place within twenty-four to forty-eight hours of the onset of symptoms. The total number of animals affected was thirteen all of which died.

Lesions.

On *post-mortem* examination the most striking feature observed was the presence of a thick layer of yellowish transparent gelatinous exudate in the subcutaneous tissue of the abdomen and of the inside of the thighs extending in some cases to the axillary region. Some of the muscles appeared to be abnormal, particularly the biceps femoris, semitendinosus, semimembranosus and psoas. These were soft and œdematous but were not broken down or dark in colour as is the case with blackleg muscle. Little or no gas was present except in one animal which fractured a leg after the onset of symptoms. In this case the limb became very emphysematous before death. No abnormalities were noted in the internal organs apart from some excess of fluid in the serous cavities and a possible slight enlargement of the spleen.

Bacteriological Examination.

The material received for investigation consisted of portions of muscle and spleen together with swabs of the subcutaneous exudate.

This was found to contain an organism that proved to belong to the œdematiens group It was present in large numbers in smear preparations. Direct cultures were obtained in liver broth, meat broth and on serum agar. The organism was also recovered from the heart blood of guinea pigs that were inoculated with an emulsion of the material. The latter cultures were found to be pure, but those made direct were presumably contaminated from the outset by B. sporogenes although the presence of this organism was not suspected until the tubes had been left standing for some days at room temperature. There was no difficulty, however, in obtaining a pure culture of B. œdematiens by transplanting single colonies from the agar plates.

Characters of the Organism.

Morphology.

A rather large bacillus with rounded ends of an average width of 1 μ and varying in length from 3-8 μ. The individual forms may be straight or curved. The organism occurs singly or in short chains of two or three elements. Spore formation takes place both in the animal body and in artificial media. The spores are oval, subterminal and do not greatly distend the bacillus.

Staining Reactions.

In young cultures the organism is uniformly stained by the ordinary dyes and is Gram positive. Older cultures show a number of elements that are unevenly stained and some which are Gram negative.

Motility.

In ordinary hanging drop preparations the bacillus is not obviously motile but in stained smears the presence of numerous peretrichous flagella can be demonstrated. In this respect therefore it conforms to the description given by most authors of organisms of this group.

Cultural Characters.

Strictly anærobic conditions are necessary for growth. When freshly isolated the organism did not grow at all luxuriantly in any medium except liver broth, and it was only after it had been sub-cultivated for some time that satisfactory growths were obtained in many of the ordinary media. Even now it still fails to grow in deep glucose agar. Somewhat similar experiences have been noted by Weinberg and Séguin and by Turner and Davesne.

In liver broth growth is very rapid and abundant producing uniform turbidity with the evolution of a large quantity of gas. Many

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spores are present after 24 hours. Later, the growth sediments quickly forming a large amount of deposit at the bottom of the tube, and leaving the supernatant fluid quite clear. This tendency to flocculation occurred in all liquid cultures, and we were unable to detect any evidence of variation similar to that described by McEwen who found that a strain of the organism which he isolated direct from bovine muscle showed no evidence of flocculation, thus differing from that recovered from inoculated guinea pigs. McEwen suggested that the passage of B. œdematiens through a bovine may possibly have accounted for the suppression of a normal character of the organism namely flocculation, but this variation is evidently not the constant result of such passage. In the ordinary meat broth the growth is not so abundant as in liver broth. The medium first becomes slightly turbid and a few bubbles of gas are produced. Numerous spores are present after eighteen hours' incubation. The meat appears to undergo but little change, and when the growth has sedimented it is hardly possible, by the naked eye, to distinguish such a culture from an uninoculated tube of this medium. In Robertson's cooked meat medium, however, the growth is much more abundant. The organism grows well in brain broth with evolutions of gas. Only slight blackening of an iron nail is produced. Growth is very scanty in ordinary broth, but is more abundant in the presence of glucose or serum, especially the latter. In deep serum glucose agar cultures the colonies are at first dense and lenticular. Later, their edges become fluffy and finally they appear loose and filamentous in texture, resembling the so-called snowflakes. The medium becomes split by gas. On the surface of serum agar small dewdrop-like colonies are formed which are either circular or irregular in outline and tend to spread and become flat with continued incubation. A similar growth takes place on blood agar, but there is no evidence of hæmolysis on this medium. Slight hæmolysis, however, occurs in cultures in blood broth. The organism does not liquefy solid serum or Dorset's egg. On Petroff's medium the surface layer becomes decolorised. Gelatin to which 2 per cent. glucose has been added becomes liquefied after three to five days' incubation. In plain gelatin no growth occurs. The organism grows slowly in litmus milk producing slight acidity but no coagulation.

Action on Carbohydrates.

Glucose, levulose and maltose are fermented with the formation of acid and gas. Saccharose, lactose, mannite, dulcite, glycerin and inulin remain unchanged.

Pathogenicity.

The organism sets up a fatal infection when injected into guinea

pigs, rabbits and mice. Its effect on the large animals has not been tested. When freshly isolated the subcutaneous or intramuscular injection of 0.1 c.c. of liver broth culture killed guinea pigs in 18 hours, whilst a dose of 0.05 c.c. was fatal in 36-48 hours. The virulence of the strain remained fairly constant in artificial culture for the first few months, but has since declined to such an extent that doses of culture less than 2 c.c. are no longer fatal to the guinea pig.

Lesions in Experimental Animals.

There is extensive œdema of the subcutaneous tissue of the abdominal wall spreading forward to the axillary region and in some cases to the intermaxillary space. This exudate which is gelatinous and hæmorrhagic in appearance, contains throughout a large number of organisms some of which show evidence of sporulation. A few small bubbles of gas are also present. The odour is faintly rancid, but not putrid. Following subcutaneous administration the muscles show no change in appearance, but they become distinctly hæmorrhagic at the site of inoculation after intramuscular injection. The serous cavities may or may not contain a slight excess of clear fluid, which may be quite abundant in the pericardial sac in the rabbit. The internal organs may show slight congestion, but this again is variable, and never very well marked. The organism is present on the peritoneal surface of the liver occurring singly or in pairs, but not in the form of filaments. It is constantly present in the heart blood even in animals killed for examination some few hours before death would otherwise have taken place.

Toxin.

Repeated attempts to obtain a toxin by growing the organism in various media have proved unsuccessful. In every case the culture filtrate has failed to produce any harmful effect when injected into mice in doses up to 0.5 c.c.

Experiments with B. Œdematiens Antiserum.

The administration of B. œdematiens antiserum affords complete protection to guinea pigs from the pathogenic effects of this organism even when inoculated in quantities several times greater than the minimum lethal dose for control animals. We are much indebted to Dr. R. A. O'Brien of the Wellcome Physiological Research Laboratories for his kindness in providing us with a supply of this serum.

Discussion.

In its morphological and cultural characters the organism resembles B. œdematiens in all essential points. It differs, however, from the majority of strains of that organism in that it appears to be com-

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pletely non-toxigenic. Moreover, it is invariably septicæmic in experimental animals in which it produces a deeply hæmorrhagic subcutaneous œdema. Weinberg and Séguin describe two types of B. œdematiens—the " toxigenic " and the " virulent." The former tends to remain localised at the point of injection in experimental animals and gives rise to a colourless œdema while the latter shows invasive tendencies and is septicæmic. The organism described by Turner and Davesne was originally of the " toxigenic " type but after a series of passages in deep agar it changed to the " virulent " form and at the same time lost much of its power of elaborating toxin. It would appear that the organism described in this article represents an extreme case of the " virulent " as opposed to the " toxigenic " type of B. œdematiens.

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MEDICAL RESEARCH COMMITTEE.—Special Report Series No. 39. Report of the Committee upon Anærobic Bacteria and Infections.

IMMUNISATION OF HOGGS* AGAINST BRAXY

By W. LYLE STEWART, M.R.C.V.S.,
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(In collaboration with the Veterinary Laboratory of the Wellcome Physiological Research Laboratories.)

NIELSEN (1) in 1888 described a bacillus associated with Bradsot, and eight years later this work was confirmed by Jensen (2) who studied the bacteriology of Bradsot on material sent from Iceland and the Faroe Islands. Jensen also showed that sheep can be actively immunised against the disease by use of a special antigen. In 1922 Gaiger (3), working in Scotland on Braxy of young sheep, isolated Vibrion septique from affected animals, and his work indicated that Braxy in sheep in Scotland is identical with the Bradsot of Iceland. He also showed that the disease can be prevented in sheep by the injection of the toxin of Vibrion septique. Allen and Bosworth (4) carried out experiments from which it can be concluded that, using 50 per cent. under-neutralised mixture of Vibrion septique toxin and antitoxin as an antigen, active immunity can be produced in sheep, and that they will withstand a fatal dose of Vibrion septique culture.

Bosworth (3) carried out field experiments with the above mixture with the following result. Of 1,480 hoggs inoculated on twenty-two farms, 31 or 2.09 per cent. died from Braxy, while of 1,696 uninoculated hoggs on the same farms, 120 or 7.70 per cent. died. Dalling, Allen and Mason (6) record the result of a field experiment in which a similar antigen was used in sheep : 549 sheep on seven farms were inoculated. Of these 2 or .37 per cent. died from Braxy, while of 464 sheep on the same farms, but receiving no inoculation of antigen, 72 or 15.5 per cent. died. The same authors (7) carried out a further test the results of which are that " the use of vaccine . . . reduced the mortality in hoggs from 6.8 per cent. among 1,457 unvaccinated sheep to 2.2 per cent. among 4,010 vaccinated." For the past two seasons we have carried out field experiments in which a modified Vibrion septique antigen—Anaculture (or toxoided whole culture)—was used. The material was made, tested and standardised by the Veterinary department at the Wellcome Physiological Research Laboratories.

In season 1927-28 the experiment consisted in inoculating about an equal number of hoggs on five farms with the usual 50 per cent. under-neutralised toxin antitoxin mixture, and with Anaculture (toxoided whole culture). Hoggs treated with T.A.M. received two inoculations

* Young sheep of both sexes are known as hoggs during their first winter of life.

—a fortnight elapsing between them. On two farms two doses of Anaculture were injected at the above interval, while on the other three farms one dose only of Anaculture was used. The results of the experiment are detailed in Table I.

Table I.

	Toxin antitoxin mixture			Anaculture. (*Toxoided whole culture*)		
Farm	Hoggs inoculated	Died Braxy	%	Hoggs inoculated	Died Braxy	%
1	67	2	3	69*	0	0
2	57	0	0	57	0	0
3	94	1	1·06	91	1	1
4	110	1	0·9	116*	0	0
5	39	2	5·0	39*	0	0
Totals	367	6	1·6	372	1	0·3

* Only one dose given.

It is unfortunate that control uninoculated hoggs were not kept on these farms. All that can be deduced from the experiment is that, in the light of past years' experience which showed that Vibrion septique toxin antitoxin is a good antigen for immunising hoggs against Braxy, Anaculture may be an equally efficient immunising agent. Moreover, one dose may be sufficient to prevent naturally occurring Braxy.

In 1928-29 further experiments were undertaken to show whether the single Anaculture inoculation method would prove efficient in the prevention of Braxy. The farms chosen were places where the disease is enzootic, and most of the flockmasters had previous experience of the T.A.M. inoculation method. The experiment was spread over twelve farms and approximately 75 per cent. of the hoggs were inoculated, and the remaining 25 per cent. received no treatment and therefore served as controls. Table II shows the result of the experiment in which 1,222 hoggs were inoculated once only with Vibrion septique Anaculture, while 456 animals on the same farms were left as controls. Of the former 17 or 1.4 per cent. died from Braxy, and from the controls 43 or 9.4 per cent. died. The result of the experiment indicates that one dose of Anaculture may be sufficient to protect hoggs against naturally occurring Braxy.

Table II.

Farms	Hoggs inoculated with Toxoid.	Deaths from Braxy	%	Control Hoggs Uninoculated.	Deaths from Braxy.	%
1	138	3	2·17	46	4	8·7
2	126	2	1·60	42	3	7·14
3	60	0	0	20	1	5·0
4	95	2	2·10	13	0	0
5	117	1	·85	20	1	5·0
6	78	1	1·30	45	5	11·1
7	152	2	1·31	59	6	10·53
8	112	2	1·78	37	6	16·2
9	123	1	·81	40	3	7·5
10	125	0	0	41	2	5·0
11	56	1	1·78	55	10	18·0
12	40	2	5·00	40	2	5·0
12	1222	17	1·4%	456	43	9·4%

It is hoped to arrange a further series of experiments within the next few months and to publish the results with a discussion of our ideas on the possible reason for the efficacy of the single dose Vibrion septique Anaculture method of inoculating against Braxy in hoggs.

Summary and Conclusion.

A single dose of Vibrion septique Anaculture (toxoided whole culture) appears to protect hoggs against Braxy in the field.

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MEMORANDUM* ON THE REPORT OF THE COMMITTEE APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES.

By R. MAGREGOR, M.R.C.V.S.,
Government Veterinary Surgeon, Malay States.

1. THE Report of the Lovat Committee to inquire into the Colonial Veterinary Services has apparently received well merited

* Passed unanimously at the July Meeting (1929) of the Far Eastern Veterinary Medical Association.

approval from all quarters concerned, and we earnestly hope that the recommendations contained therein will be put into action early.

2. There is, however, one paragraph which, in our opinion, is a trifle misleading. Para. 81, Part VII, states :

> " As regards salaries, we consider that the initial salary of £600 per annum is adequate and compared favourably with that paid in other scientific departments. In our opinion salaries obtained during his passage through a ' long scale ' (such as those in existence in the Tropical African Colonies and in Malaya) are sufficiently remunerative for an officer of average ability."

3. According to the report no evidence was taken from Malaya, but the facts are these.

A Veterinary Surgeon s initial salary is £560 with a 10 per cent. allowance that may cut off at any time, and in any case does not count for pension. In this initial salary he is on the same level as Agricultural Officers, Schoolmasters and Education Officers, Electrical Engineers, Forest Officers, Chemists and Pharmacists, Inspectors of Mines, Railways and Buildings, Post Office and P.W.D. Storekeepers and Accountants, Geologists, Town Planners and all Engineers.

4. Out of this list, the Geologists, the Chemists and the Civil Engineers alone can be considered as our scientific equals.

Dentists are considered equal to Medical Officers and have an initial salary of £700.

5. Each of the first five years of service, the Veterinary Surgeon's salary will rise by $20 per month (£2 6s. 8d.) as compared with $25 (£2 18s. 4d.) of all these other officers with the following results :

A. After one year of service all these officers will take precedence of the Veterinary Surgeon at Official functions. Should any shortage of houses occur, the needs of the Veterinary Surgeon will be considered last, and at any time he may be required to make room for one of these better paid officers.

B. After four years service each of these officers will be entitled to better quarters and better travelling allowances than the Veterinary Surgeon, and each of them will have reached the initial salary of a doctor or dentist, a salary that will not be given to the Veterinary Surgeon for five years.

C. After sixteen years service each will have reached his maximum salary, a point which the Veterinary Surgeon cannot attain until he has served seventeen years. Doctors and Dentists attain this in twelve years.

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List of Diseases Proved to have Occurred in Malaya.

Disease.	Animals Affected.	Effects on Animals.	Effects on Owners.	Possible method of combating.
Rinderpest	Buffalo Oxen	Heavy death rate	Loss of meat Loss of padi (rice) Loss of capital	Quarantine and Inoculations
Hæmorrhagic Septæmia	Buffalo	Heavy death rate	Ditto.	Ditto.
Anthrax	Oxen Buffalo Sheep and Goat	Small death rate	Loss of capital Danger to humans	Inoculation
Surra	Buffalo Oxen Dogs	Loss of condition Reduced vitality and resistance to other diseases	Loss of capital	Medicinal Treatment and anti-fly campaign
Swine Fever and Swine Erysipelas	Swine	Heavy death rate	Loss of meat and capital	Quarantine and Inoculation
Rabies	Dogs	Danger to humans Suffering to dogs by muzzling	Inconvenience to owners	Quarantine and Inoculation
Foot and Mouth Diseases	Cattle and pigs	Occasional deaths Loss of condition	Loss of labour	Quarantine
Feline Distemper Feline Mange	Cats	Heavy death rate	Loss of padi from mice	Quarantine and medicinal treatment
Fowl Cholera Fowl Typhus	Fowls	Heavy death rate	Loss of meat and eggs	Quarantine and Inoculation
Redwater	Cattle	Lowered resistance to disease Loss of condition	Loss of meat, labour and capital	Dipping
Ticks and leeches	Cattle.	Spread of Redwater	Ditto.	Ditto.
Intestinal and bronchial parates	All animals	Loss of condition Death Danger to men	Ill health Loss of meat Loss of labour Loss of capital	Medicinal treatment
Contagious Pleuro Pneumonia	Goats	Heavy death rate	Loss of meat	Quarantine
Kumri	Horses	Heavy death rate	Loss of capital	
Heart Worm	Dogs	Heavy death rate	Loss of pet animals.	

6. Now as an officer on retirement draws a pension calculated on his average salary for three years prior to retirement, it follows that Doctors can retire on full pension after fifteen years service, other officers after nineteen and Veterinary Surgeons after twenty at an age of no more than forty years; the extra year in this climate being extremely trying and frequently destructive to the health.

Similarly, the widow and orphans of a Veterinary Surgeon who dies during service will receive a pension calculated at a lower rate than that of any other officer.

We therefore fail to see where the favourable comparison of salaries can be made.

7. We have already formally complained of the impossibility of a Veterinary Surgeon attaining any promotion or super scale appointments on account of the parsimony with which we are equipped and the discouragement we receive in our work, but, as this has been dealt with very ably and emphatically in the Report, nothing further may be added.

8. In conclusion, we would emphasise that salaries quoted in English pounds without further comments are extremely apt to mislead. The intending applicant for a post abroad should always endeavour to obtain information as to the salaries paid to his associates, for it is their salaries that rule the question of cost of living.

Clinical Articles

Tetanus in a Monkey Successfully Treated with Saturated Solution of Magnesium Sulphate.

By J. CHOWDHURY, G.B.V.C.,
State Veterinary Officer, Jaipur, India, Rajputana.

PATIENT :—A young Ceylon Monkey.

Some days back at feeding time, while the keeper was entering the cage, it escaped and was bitten by a dog.

One wound was pretty deep, others were only skin deep. It was a problem to dress the wounds as he would not allow handling, but after the first two days syringing and dry dressing he came to realise the situation and quietly submitted to the process, but the main difficulty of keeping the wound aseptic could not be overcome as he would not refrain from picking the part. The wound was having attention

once a day but just at this stage I had to go away for two days, and on my return there were distinct symptoms of tetanus.

The jaw was almost locked, so that he could only draw in liquid sustenance ; back fixed, hands had slight movement, he walked about like a stick, on hind legs, but could make no lateral movement ; his activity was confined to the floor of the cage, and he was unable to jump up to the perch. His motions very offensive and semi-solid.

Treatment was carried out on the lines recommended by Captain Dawson for horses. Saturated solution of magnesium sulphate 2½ c.c. being injected twice daily. Having given six injections, two per day, I dropped to one injection and he is now jumping about like he used to do and is seen at all unapproachable places. He is like a child again at the sight of feed.

No anti-tetanic serum was injected.

Inquiry. Any suggestion as to the use and dosage of anti-tetanic serum in such subject will be welcome.

Abstracts

The Doppler Process in Veterinary Practice.

By PROFESSOR DR. A. ANTONINI,
Milan.

THIS process, well known in human surgery, where it seems so far to have given excellent results in various morbid conditions, and especially in those changes which come with old age, has been introduced by me into veterinary practice, but I am postponing the description of my results until after I have had the opportunity of testing it on the large scale which its importance seems to deserve. Meanwhile I will give ân account of the operation itself in the interests of such colleagues as may wish to try it.

To begin with, let me state that the Doppler process depends on the action of certain substances on the perivascular fibres of the sympathetic and the inventor of the process has, after much experimenting, succeeded in obtaining a substance which he calls isophenal that, by counteracting the effects of the vaso-constrictor fibres, produces a permanent dilatation of the arteries, thereby allowing an increased flow of blood into the organ nourished by them.

The applications of the Doppler treatment are most varied, and in human surgery in Italy, Prof. Caneva-Zannini has extended its application with the very best results to the conservative surgery of the joints in very serious and " incurable " cases.

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In veterinary surgery, though its field of application may be much more restricted, its use is indicated, e.g. in the case of certain torpid sores on the limbs of our animals. Without, however, for the moment risking a positive judgment, I feel sure that its most attractive and useful application is the treatment of the sex glands, both male and female, and my thanks are due to Dr. Doppler for making me the instrument of its introduction into veterinary practice, and putting me in touch with Prof. Caneva-Zannini for the appropriate instruction.

THE OPERATION. The actual operation is easy enough and in itself quite free from danger. It merely consists in exposing the main artery of the testis, scarifying the albuginea and generously painting these organs with isophenal. The animal is thrown on its left side as for castration. After careful disinfection of the field of operation, and local anæsthetizing, associated possibly with a light general anæsthesia, an incision of 12 to 15 cms. is made along the anterior margin of the spermatic cord, till the anterior margin of the testis is reached. Then, having exposed a large part of the funicle by an incision of the common sheath, the connective tissue surrounding the pampiniform plexus is carefully torn with the fingers, so that the artery can be easily felt through its thickness and is thus soon isolated for a stretch of some centimetres, indeed, as far as can be managed. As soon as this is done, the testis is taken out of the vaginal cavity, the albuginea is lightly scarified and the liquid painted on. The testis is then replaced in the vaginalis without suture, in order to avoid any possible compression along the cord. Then the skin is sewn up. It is to be carefully noted that, in order to avoid dilution of the liquid with blood, all hæmorrhage must be completely arrested in the field of operation before the painting is done. It is also well to paint the connective tissue investment of the whole funicular cord, as well as the lining of the vaginal cavity.

Dr. Doppler advises a bilateral operation, but I have confined it to one side so as to reduce the shock in animals of advanced age.

The procedure was first practised on an experimental dog, and the operation performed on two old horses that seemed to be beyond the age of fecundity, but otherwise in good condition.

The first horse was done on the 28th of February, and died of trauma 48 hours later, and the second, done on the 11th of March, left the clinic ten days later completely cicatrised, but with a rather voluminous scrotal œdema. Doppler regards the œdema as a reaction advantageous to the final success of the operation.

On the 28th of March, that is 17 days after operation, I received an urgent, and I think premature, message, from Colonel Vanzi, the owner of the horse, that it had been sent back to stud. What will be the result of this first operation time alone will show. According to Dr. Doppler

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3 or 4 months are required to give recognisable primary effects, and 7 to 9 months to enable one to judge the final results. In our case the subject of operation has been sent back to work too early, but I shall certainly be furnished with news at the end of the mounting season. As, however, we are dealing with but a single case, no useful conclusions can be drawn, but it is certainly worth testing this new operative process in both ox and horse. I say nothing of operation on the female, not having attempted it, but it will be appreciated that to operate on the utero-ovarian artery is a different matter altogether. If any colleague wishes to try the experiment and wants further explanations, I shall be pleased to communicate with him. (*La Clinica Veterinaria.*)

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Seventy Years of Veterinary Service in the United States.

By PIERRE A. FISH,
Ithaca, N. Y.

INCIDENTAL to our work in assembling material for the " History of the Veterinary Profession in America," and as a part of the effort of the A. V. M. A. Committee on History, it has been our privilege to come into possession of some interesting details relating to the census reports of the profession.

The veterinarian is regarded as the unit of service and although the data relate to statistics, some illuminating conclusions may be drawn from them.

Our knowledge of veterinary service in the United States, prior to 1850, is very meagre and seems to be attainable only by search for occasional references in the early American agricultural periodicals and foreign veterinary journals. The first official record of the number of veterinarians in this country is given in the seventh U. S. Census Report, for the year 1850. It is believed that the census reports of this early period contained some inaccuracies but they represent the only official records now available.

According to the 1850 report, there was a total of 46 veterinarians, limited to eight states of the whole country, distributed as follows: New York, 20; Ohio, 8; Massachusetts, 5; Indiana, 5; Illinois, 4; Virginia, 2; Vermont, 1; District of Columbia, 1; Each decade has shown an increase and for the sake of conciseness, the figures are given in Table I.

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Table I.—Census Figures on Veterinarians.

Census	Year	Veterinarians	Increase %
7th	1850	46	
8th	1860	392	752·1
9th	1870	1166	197·4
10th	1880	2130	82·6
11th	1890	6494	205·0
12th	1900	8163	25·7
13th	1910	11652	42·7
14th	1920	13494	15·7

It may be noted from Table I that the percentage of increase in the number of veterinarians shows a very decided falling off after 1890. This date represents the line of cleavage between the lawless period, when practically no barriers existed to prevent anyone from practising as a veterinarian, and the legal period when educational standards began to be required and a number of the states enacted laws regulating veterinary practice.

Various facts of great interest may be obtained from a study of these reports relative to the development of veterinary service in different sections of the country and, in the later reports, comparing the gain and loss in certain sections with other sections. In the earlier years, the veterinarians established themselves principally along the Atlantic Coast, from Virginia northward, and in the states bordering the Great Lakes, as far west as the Mississippi River.

In the census of 1850, it is interesting to note that nearly half of the veterinarians in the whole country were located in New York State and New York maintained the lead in veterinary population until 1910, with the exception of the year 1860, when Pennsylvania was listed with a majority of one veterinarian over New York. In 1910, Illinois took the lead, with New York second in 1920, Illinois was still leading, with New York in fourth place.

Until 1910, the larger half of the total veterinarians was located in the Middle Atlantic (New York, New Jersey and Pennsylvania) and East North Central States (Ohio, Indiana, Illinois, Michigan, Wisconsin). In 1910, the Middle Atlantic States were displaced by the West North Central States (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas). All sections of the country showed a gain in the number of veterinarians until 1910; at that time, and in

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1920, only the New England and Middle Atlantic States showed a decline. Among the individual states showing a decline (1920), New York stood first, with a loss of 127 veterinarians.

Although the majority of the veterinarians is located in the North Central States, the rate of increase from 1910 to 1920 has been greater in the Southern States than in any other section. In North Carolina the number was trebled and in a number of other southern states the numbers were more than doubled. The tide of the veterinary population is apparently receding from the north-eastern section of the country and increasing in the North Central States, and the South.

In the census of 1870, information was given relative to the nationality of the veterinarians as follows: Americans, 63.8%; British, 20.4%; German, 10.5%; other nationalities, 5.3%.

That the female veterinarian is a recent development seems to be contra-indicated by the fact that in 1890 two were listed; in 1900, fourteen; in 1910, none; in 1920, one.

If, in 1850, there had been 48 states in the Union, only 46 of them could have been supplied with a veterinarian; two states would have been without veterinary service. On the basis of the 1920 report, an equal apportionment would have provided each state with 281 veterinarians and six of the states could have had an extra man. This represents the numerical growth of the profession in 70 years.

The six states containing the greatest number of veterinarians in 1910 maintained that honour in 1920, but there was a rearrangement of their order, as shown in Table II.

Table II.—Relative Positions of States in 1910 and 1920.

Rank	State	1910	Rank	State	1920
1	Illinois	1038	1	Illinois	1146
2	New York	981	2	Iowa	972
3	Ohio	782	3	Ohio	860
4	Iowa	692	4	New York	854
5	Pennsylvania	676	5	Indiana	754
6	Indiana	637	6	Pennsylvania	698

Iowa displaced New York and Indiana displaced Pennsylvania.

The report of the 1920 census was of particular interest, coming as it did soon after the close of the World War, in which approximately 20 per cent. of the veterinarians participated. The present decade, with a reduced number of veterinary schools and a consequent lessened production of veterinarians, along with other factors affecting the profession, will give still greater interest to the report of the not-far-distant 1930 census.

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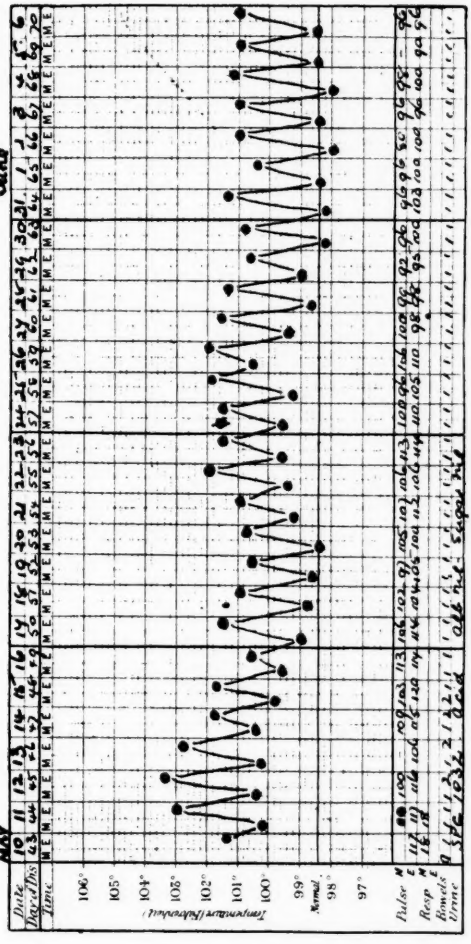
A Case of Brucella Abortus Infection in Man.

It has been known since 1924 that the bacillus of Bang, which was discovered by Prof. Bang of Copenhagen in 1897, was capable of producing in man a disease indistinguishable clinically from Malta fever. The bacterium is now called *Brucella abortus*, after Surgeon-Major Bruce, who isolated the specific organism of Malta fever in 1887 and called it *Micrococcus melitensis*. It is now known as *Brucella melitensis*. Both Malta fever and Bang's disease are characterized



by prolonged fever, profuse sweats, joint pains, enlargement of spleen and liver, leucopenia and anæmia. The character of the fever is undulating, hence the name " undulant fever," which is applied indiscriminately both to Malta fever and Bang's disease. Both diseases come from milk, in the case of Malta fever from goats' milk, and in the other from cows' milk. In cattle Bang's bacillus produces an epidemic abortion, which is very infectious, very common, and a source of great loss to farmers. In Gloucestershire, the veterinary surgeons tell me, epidemic abortion is extremely rife, and defies all the care and precautions taken against it.

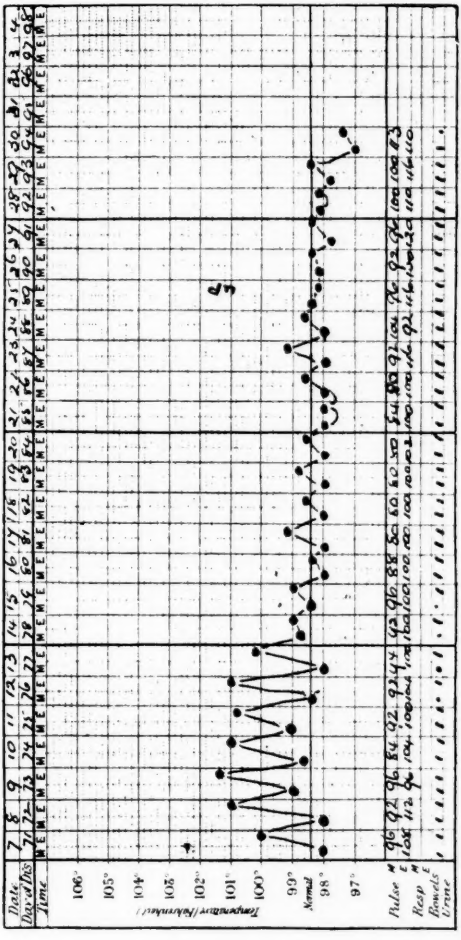
The opinion has been held for many years that abortion in women is produced by drinking milk from cows that have expelled their fœtuses prematurely. In 1917 an American published a series of 12 cases in which circumstantial evidence pointed to abortions in women having been due to drinking infected milk. It is interesting to note that the organism which gives goats that disease of the udders which causes Malta fever in man has the effect on the goats of causing abortion, so that both *Brucella melitensis* and *Brucella abortus* are abortion-producing bacteria.

Since 1924 numbers of cases of Bang's disease in men have been reported and, if one looks up the references in a library, such as the Radcliffe section of the Bodleian, the number of cases and articles are surprising, especially when it is realized how little is known of the disease even now. When my case occurred at least six medical men of much higher attainments than myself had never heard of it when I asked them for their opinion.

The manifestations of *Brucella abortus* in cattle are, in the female, abortion and its sequelæ, and in the male, occasionally tissue necrosis in the generative organs. The human manifestations are abortions in the female, together with an illness, and in the male, a prolonged fever with the symptoms mentioned above. The infection is easily mistaken in its early stages for typhoid or tuberculosis.

In the case that came under my notice in April, 1929, there are several points which make it interesting. The first that strikes one is that perhaps the last person one would suspect of having this milk-borne disease would be our local dispensing chemist, who drinks practically no milk, never goes near a cow, and sees nothing of any farm hands except across the counter. He is 50 years of age and has never been abroad. He gets influenza often, and he began to feel ill at the end of March, 1929, with chilliness and achings in his limbs, just as he always has with influenza. He went to bed, and I treated him as a case of influenza, taking his temperature every morning when I visited him. To my surprise his temperature was always 100° to 102° long

after an ordinary influenza temperature would have subsided, in spite of his having no physical signs. He had a slight cough, and he looked so thin and weedy that I got the tuberculosis medical officer to examine him and at the same time I sent his blood to Dr. E. N. Davey, the Pathologist at Gloucester Infirmary, as a possible typhoid. He was reported apparently free from tuberculosis, and the report on the blood came back as negative to typhoid and para-typhoid, but positive to the *Brucella abortus*. Dr. Davey is particularly interested in *Brucella abortus* and in his work on the subject with Dr. Gardner, the Oxford



Pathologist, he tests all blood specimens for agglutination with this organism.

The patient came into the Fairford Cottage Hospital in May. He had been ill for five weeks before admission with a continuous pyrexia without physical signs, a feature of the illness being drenching sweats at night—so drenching that we had to have a special nurse to change his night things two or three times every night. Beyond this sign and the fever there was nothing to be made out on examining him. There was nothing abnormal in the urine ; no enlargement of spleen or liver ; no arthritic signs or symptoms ; nothing abnormal in chest or throat. There was no diarrhœa and no sickness, and he took food well. Once he was in Hospital he began to pick up and put on weight, in spite of the fever, which went on for fourteen weeks, and the rapid pulse, which never fell below 100. Now that he has been afebrile for some time his pulse is still over 100, though I cannot find anything wrong with his heart. The chart shows the undulating character of the fever well.

As to treatment, I could find very few references to it except urotropine gr. x *t.d.s.* We tried large doses of quinine without effect. Dr. Gardner was making a vaccine, but by that time he was so much better. At last the patient himself said he would like to try salol, and from that moment his temperature dropped—*post hoc* almost certainly, but salol would be worth trying in another case.

Dr. Davey's report dated May 23rd says—The following are the findings so far :

1. The brother's serum shows no agglutination. (The brother had influenza too, and we wondered if he had Bang's disease also).

2. Patient's serum agglutinates *B. abortus* 1 : 25, 1 : 50, 1 : 125, 1 : 250, 1 : 500, 1 : 1000, 1 : 2500, 1 : 5000 dilutions. (*N.B.*—This is the highest dilution reported in any previous case I believe.)

3. Patient's serum agglutinates *B. melitensis* 1 : 25, 1 : 50, 1 : 125, 1 : 250, 1 : 500 dilutions.

4. Patient's blood has so far not yielded any organism in culture.

5. Patient's leucocyte count is 5000 per c.mm., polymorphonuclears 42%, small lymphocytes 45%, large hyalines 8%, myelocytes 5%, showing a leucopenia with a relative lymphocytosis. These facts, says, Dr. Davey, clinch the diagnosis beyond yea or nay.

Since my case there has been a case reported in the *British Medical Journal*, the eighth in England they say. This makes the ninth. The point is that it is worth looking for in puzzling cases of fever without physical signs. If anyone wishes to read up the subject he will find many interesting references in the Bodleian, but the best account is a report of a symposium on the subject in the *Journal of the American*

Veterinary Medical Association for March, 1929, from which I have borrowed most of the first part of this account.

H. E. BLOXSOME.
E. N. DAVEY.

[It may be added as a postscript that on August 20th, five months after the onset, the blood picture is the same. The serum does not agglutinate the *Brucella abortus* in so high a dilution. Tachycardia and general weakness are still present. These facts point to the infection being still present, though waning. As in Malta fever, the infection may take two years to disappear. Meanwhile the patient is still taking salol.]

(*St. Bartholomew's Hospital Journal.*)

Experiences with Epidural Anæsthesia from the Obstetric Point of View.

By JOHANNES RICHTER,

*Institute of Zootechny and Obstetrics, University of Leipzic.**

SACRAL or epidural anæsthesia was introduced in obstetrics by Cathelin in 1901, and by Stöckel in man was first carried out in 1909.

Pape and Pitzschk have conducted experiments on horses and Benesch on cattle (1926); the tests of the last author dealt with the possibility of allaying labour pains, the pains of embryotomy and prolapsus uterus and the use of the method in ovariotomy of cows and mares.

The author has conducted epidural anæsthesia on 80 animals at the Leipzig clinic, including practical parturition cases and 20 test and demonstration animals. As regards the technic of the operation, the injection place is on the dorsal side of the root of the tail, and lies between the first and second coccygeal vertebra. It can be felt as a wide hollow. The needle is pushed in forwards at an acute angle into the spinal canal drawn back a little and the contents of the syringe emptied. As anæsthetics, 0.5 to 1.5 per cent. tutocain (Benesch) or chemocain 1 to 2 per cent. (Richter), are used. Symmetrical anæsthesia begins in 3 to 5 minutes and affects the anus, perineum, womb and rectum, and after 15 minutes extends in an elliptical form whose outer boundaries extend from the middle of the sacrum via the angles of the ischium to the inside of the thighs. In the case of too large doses weakness of the hind extremities, staggering and falling down occur.

Richter describes some cases of parturition in cattle which were treated under epidural anæsthesia. Among them embryotomy of an

* *Berliner Tierarzt Woch*, No. 1, 1929 (Ex Schweizer Archiv. für Tierheilkunde, July, 1929). Translated by Mr. J. T. Edwards, B.Sc., M.R.C.V.S.

emphysematous calf without any reaction on the patient (straining, pressing, lying down, pains, etc.) being evident.

A torsio uteri of a cow pregnant with twins was remedied by rolling of the animal and both calves easily delivered. Amputation of the left hind limb of a fœtus was accomplished with ease in a quiet standing animal. A case of commencing abortion was remedied by strong traction, after use of 1 per cent. chemokain, without the animal lying down or knocking about.

The next group of patients, 16 in number, comprised cases of retention of the secundines and was treated by epidural anæsthesia and manual removal of the cleansing. The advantages according to Richter are the passive state of the genital canal and rectum, and removal of the afterbirth under pleasant conditions for the operator and patients (no straining and pressing, and no voidance of dung and urine, etc.). Richter states that vaginal clamps can be put on in cases of prolapse without any pain to the animal but the anæsthesia is not sufficient to do away with abdominal pressure in cases of total prolapse of the uterus. Richter also employed the method in treating cases of puerperal affections of the uterus and sterility and also in performing ovariotomy in cattle. In the smaller ruminants, and in cats and dogs, there is room for improvement as to the certainty of epidural anæsthesia.

Götze of Hannover, writing in D.T.W. (36-823) uses as a rule 10c.c. of a 0.5 per cent. solution of tutocain or novocain in cattle practice. He has employed it in difficult parturitions, embryotomies and torsion of the uterus. He uses the method also in examinations and treatment for sterility. For operations on the penis, amputation of the udder and Cæsarean section high sacral anæsthesia is employed. Thirty c.c. of a 3 per cent. tutocain solution is injected with a 14 c.m. long and 1.7 c.m. needle with mandrin, between the last lumbar vertebra and sacrum.

News

Veterinary Science in Estonia.

Veterinary Science in Estonia is of University standard, the qualifying degree being only obtainable after a five years' course in the Veterinary Faculty of the University of Tartu—this being the name by which the former City of Dorpat is now known.

The Veterinary School of Dorpat was founded in 1848 and was added to the University as a Veterinary Faculty in 1919.

The teaching staff, which is twelve in number, includes Professors, Academic Lecturers, and one Prosector; the Dean of the Faculty being Dr. Med. Vet. K. Saral, who also occupies the Chair of Surgery.

There are three separate clinics, those respectively being named the internal, surgical, and that of the small animals.

Mr. Jules Tehver, a veterinary graduate, is the Scientific Stipendiary of the Tartu University.

Empire Marketing Board.

FELLOWSHIPS IN SOUTH AFRICA.

ARRANGEMENTS for the institution of three fellowships at Onderstepoort laboratory have been completed between Major Elliot, the chairman of the Research Grants Committee of the Empire Marketing Board, and Dr. Dutoit, the Union Director of Veterinary Research.

The appointments will be in the neighbourhood of £1,000 per annum, and will each be tenable for five years.

The actual recommendation of candidates to the Marketing Board will be made by a committee of which the president of the Royal Society has consented to act as chairman. The High Commissioner for South Africa will represent the Union Government.

The Marketing Board is providing a capital grant of £10,000 for building or library extension required in connection with the scheme, and is also providing an annual grant of £11,000, of which £3,000 will be used for the fellowships, and the balance will be used in connection with the research to be carried out.

The Union Government's share of the scheme lies in placing Onderstepoort's facilities at the disposal of the selected candidates.—*Reuter.*

(*The Daily Telegraph.*)

Reviews

Canine Nursing. By DAVID ERIC WILKINSON, M.R.C.V.S. 40 pages, 5 illustrations. Bradford. Watmoughs, Ltd. Price 3/6 net.

IN a small text book of some 40 pages Mr. Wilkinson has condensed the work of many years' practical experience of canine nursing, and the book will be useful to those who have canine infirmaries or those who

desire to follow up this branch of veterinary work as a profession. Commencing with the introduction of the reader to the subject on general principles, Mr. Wilkinson discusses the general lay-out of a hospital operating room and kennels attached. Then follow some very useful little hints for the amateur on the preparation of the patient before and after a severe operation; with a chapter on the administration of medicines and the general routine followed in most of the large canine hospitals. These hints will be especially useful to the young probationer in canine nursing, and some of them too may usefully be taken to heart by the veterinary student. The final chapters deal with Dietetics and General Nursing; and, as a high proportion of the students in the various Veterinary Colleges will in all probability take up practices where there are a lot of canine patients, and the small cost of the book brings it within the range of everybody, we can confidently state that this little manual should be given a place on every student's bookshelf, as well as that of every existing canine practitioner.

Modern Horse Management. By MAJOR REGINALD S. TIMMIS, D.S.O. Revised Edition. London. Cassell & Co. pp. 325, with 80 photographs. 15/- nett.

MAJOR REGINALD TIMMIS is well known as an enthusiast wherever the horse is concerned, and the fact that his book on Horse Management has passed into a second edition is proof of its popularity. Divided into some thirteen chapters the subject headings cover a very wide range, perhaps rather wider and deeper than any one mind should attempt, and although the veterinary aspect can only be looked upon as written by an amateur, it would be as well for the author to have the technical statements supervised and corrected before they are passed into the hands of other amateurs. The paragraphs on vaccine therapy and such like would be better to be left unwritten, and the statement that " eight to sixteen ounces of chloroform will be required for a half hour operation " is a dangerous one to inculcate into the mind of an anæsthetist. One wonders where the idea comes from that " It is usual to remove the hobbles as soon as the horse is insensible." Statements like this spoil an excellent book, which otherwise has many points of value and interest to the veterinary student whilst in his second year of study for the examination in Stable Management.

Publishers' Notices

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